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Legitimacy and liminal venturing by early career researchers in science disciplines

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Abstract: This paper explores the sensemaking of a group of scientific early career researchers (ECRs), during a programme to support the commercialisation of their research. To understand their experience, the lens of narrative identity work illustrated the liminal nature of their journey, transitioning and re-transitioning betwixt and between ECR and entrepreneur. In doing so, the importance of legitimacy emerged, with professional identity overlapping with social identity. The study contributes to understanding of the academic science entrepreneur and to the role of others in defining not only 'Who I am' but 'who I am not'. The study also suggests the need to consider the role of perceived personal legitimacy throughout identity construction, whether as an ECR or as an entrepreneur.

Keywords: identity work, liminality, STEM, start-up, academic entrepreneur

Introduction:

This paper explores how a group of scientific early career researchers (ECRs) make sense of their self-identity, as they work through a programme to support the commercialisation of their research. The aim of the study was to understand how ECRs experience liminal venturing, extending earlier work by considering the impact of legitimacy (Hayter et al, 2017). In doing so, we use the lens of narrative identity work (Alvesson and Willmott, 2002) to understand their experience. Identity work is the ongoing sense-making process through which an individual constructs a meaningful relationship between their self-identity and their social identity, particularly during changing times when established identity may be threatened or replaced (Alvesson and Willmott, 2002; Brown and Coupland, 2015; Petriglieri et al, 2019). In claiming a new identity, individuals use identity work whether to retain existing identities or to embrace new identities (Hayter, 2021). The research sought to understand how institutional pressures to adopt entrepreneurial values and behaviours in order to commercialise their research impacts on their view of who they are.

These scientific ECRs are at a stage where they have developed (or been part of) research which can be applied to the market as products and services. As suggested, researchers in science disciplines in universities face increasing expectations to engage in entrepreneurship,

in order to commercialise their research as a route to add impact and improve university revenue (Hayter et al 2021; Jain et al, 2009; Meek and Wood, 2016; Siegel & Wright, 2015). The results of this, however, are variable, given that the behaviours and attributes of scientist and entrepreneur may differ and that scientists may lack the skills, resources, and social networks to commercialise effectively and may not wish to do so (Archer, 2008; Hayter et al., 2018; Dugas et al, 2018) They may also face institutional and personal constraints in developing as entrepreneurs (Authors, 2021; Hayter, 2016; Siegel and Wright, 2015). This includes potential misalignment of the research scientist work identity with commercialisation pressures from their work environment (Meek and Wood, 2016; Pratt et al, 2006). In making sense of their own identity, reality is constructed through interactions with context – which includes other members of that context (Sandberg and Tsoukas, 2015). This involves identity work, which is carried out consciously and unconsciously as identity is constructed and reconstructed (Beech 2011; Ladgeet al. 2012; Sandberg and Tsoukas, 2015) at the intersection of the person and the external environment (Caza et al, 2016).

Both limited and defined by the social contexts within which individuals construct an identity, identity work is carried out to gain legitimacy through which they can situate themselves within structures and gain social acceptance (Toyoki and Brown, 2014). Gaining acceptance means that the actions of an individual are seen as “desirable, proper, or appropriate” (Suchman, 1995, p. 574). Here legitimacy is seen as an ongoing and socially constructed process (Brown, 2022). Further Haack et al., (2021) suggest different components to this, occurring simultaneously and likely to reinforce each other - validity, where appropriateness is judged appropriate at a collective level and propriety, operating at an individual level.

Belonging to a scientific research community means undergoing a lengthy training process and being socialized to embed institutionalized norms about the purpose of science and their role within it (Meek and Wood, 2016; Van Maanen & Schein, 1979). These norms are part of their academic identity as scientific researchers and are reflected in how they discuss their work and values; their work identity becomes part of the explanation of who they are (Dutton et al, 2010). Individuals may therefore face institutional pressures to adopt an entrepreneurial identity, with possible issues in how they respond. Here each of the participants had been designated as ‘entrepreneurial lead’ in their application to take part in the programme, but this title may not have been adopted by them in defining their identity. Through an exploration of the perceptions of a small group of early career researchers during a

competitive and intensive research commercialisation programme this study aims to address a gap in current literature related to the development of academic entrepreneurship in science disciplines (Hmieleski and Powell 2018). It also extends work on liminal venturing by considering how “extrinsically motivated, controlling circumstances impact the extent to which scientists, especially graduate students and postdocs, are able to develop and incorporate a new entrepreneurial identity” (Hayter et al, 2021, 14). To begin this process, the next section reviews relevant previous literature on identity work

Role identity and identity work narratives

While scientific identity and entrepreneurial role identities have some similarities, especially in terms of the need to attract funding and to recognise and grasp opportunities (O’Kane, et al., 2020; Hayter et al. 2021), the behaviours expected from these roles also differ, causing individual conflict in self-definition (Jain et al, 2009; Wang et al, 2020). ‘Being an entrepreneur’ requires a major role transition (Hoang and Gimeno, 2010; O’Neill et al, 2022). This may cause difficulty for the individual if their existing role identity is challenged or perceived as threatened, given that it necessarily includes dealing with unknowns and uncertainties that may threaten the sense of self (O’Neill et al, 2022, 4; Petriglieri, 2011).

Such challenges occur during professional role transition, i.e., moving from a familiar or established role to one not yet understood. Here individuals are defined by the positions they adopt in relation to others (Caza et al., 2018; Mmbaga et al, 2020; Stets and Burke, 2000) as part of ongoing self- categorisation processes. Self-categorization describes the ongoing conscious and subconscious reflexive processes, which individuals engage in to evaluate past and present micro-identities and to achieve an identity (Caza et al, 2018; Oyserman et al., 2006; Raible and Williams-Middleton, 2021). Professional role identity is a form of social identity related to profession, workplace and associated aspects. Where social identity is defined as “that part of an individual’s self-concept which derives from his knowledge of his [or her] membership of a social group (or groups) together with the value and emotional significance attached to that membership” (Tajfel, 1981, p. 255), professional role identity relates to membership of specific university groups and teams and as part of a professional cohort. Changing professional roles therefore requires the individual to change their self-categorisation processes and to respond in adopting connections, frames of reference and behaviours expected for a new role, redefining their social identity in the process (Stets and Burke, 2000; Brown, 2015).

In this way, individuals make sense of their day-to-day work experience through sensemaking - continually developing an ongoing professional role identity (Caza et al, 2018; Kyratsis et al., 2017; Nelson and Irwin, 2014; Pratt et al., 2006) and linking their self-definition with a professional role (Bloom et al., 2021; Chreim et al., 2007). The familiar professional role aspired to by these participants is the scientist, specifically the research scientist. They might be expected therefore to define themselves by membership of a specific academic community based on subject discipline and by the constraints and opportunities in their particular contexts. Within universities, establishing and maintaining legitimacy in professional roles is embedded in social relations, to be recognised as having value (Archer, 2008; Dugas, 2018).

A different type of social identity is claimed by entrepreneurs. This is not a professional role identity in the same sense as research scientist, the groups which individuals seek to belong to and be seen as legitimate as an entrepreneur are wider, including other entrepreneurs, advisors, family funders, customers and suppliers. Rather than entrepreneur identity being a single fixed entity, individuals may also see themselves primarily or simultaneously as having role identities such as “innovator” (Oo et al, 2019), “inventor” (Zhan et al, 2020), “business manager” (Mathias and Williams, 2017; Authors), or “founder” (Ahsan et al., 2018; Hoang and Gimeno, 2010; O’Neil et al, 2022; Pan et al, 2019; Powell and Williams, 2014). This suggests that rather than simply being a scientist or an entrepreneur individuals may have multiple professional role identities, scientific identity, and others, including as suggested, innovator, and start-up manager (Wang et al, 2021).

Together these multiple professional role identities determine fundamental perceptions, decisions and actions while also allowing the individual to fit within different contexts (Collinson, 2003) moving from one to another (Wagenschwanz, 2021). By wearing “different hats” individuals can make decisions within the defined context (Leavitt et al, 2012; Oo et al, 2019). These decisions may be inconsistent (LeBoeuf, Shafir, & Bayuk, 2010) given that individuals navigate multiple identities to select the behaviours they deem appropriate to the occasion (Ashforth, Harrison, & Corley, 2008; Mathias and Williams, 2014; Zhan et al. 2020). Hence, while individuals may take action to ‘be an entrepreneur’, this varies related to the context and to the balance of micro-identities determining individual categorisation within a group and a desired identity (Wagenschwanz, 2021). Here the action participants

have taken includes application for this competitive programme and full participation in its different activities.

In developing a professional role identity, individuals do so at the same time as they create and recreate other identities, as suggested above. The transition from one role to another allows individuals to take decisions and make judgments (Leavitt et al, 2012; Wang et al, 2020) although different and seemingly conflicting decisions may emerge, based on the micro identity they are adopting at the time (LeBoeuf et al , 2010; Zhan et al, 2020). In this way, rather than making decisions consistent with a single identity, individuals navigate multiple identities, each of which influences individuals' decisions (Ashforth et al, 2008; Caza et al., 2018). These multiple micro-identities are constantly formed, reformed, destroyed and coalesced (Mmbaga et al, 2021; Shepherd and Patzelt, 2018).

This process of creation and recreation and management of identities has been termed identity work, an ongoing and unfinished process to define self and establish legitimacy in a role (Brown & Toyoki, 2013; Brown, 2015; McInnes and Corlett, 2012). Individuals evaluate and re-evaluate their views and actions in relation to their context (self-categorisation) and to their internal understanding of what their identity is (Ashforth and Mael, 1989; Brown, 2015; Stets and Carter, 2012). These repeated activities are the identity work carried out to establish, maintain and recreate identity, as part of an individual's "constant and relentless achievement" of self-hood (Knights and Clarke, 2014, 337), which may be needed to fit multiple external and internal contexts, with more than one version often in operation simultaneously (Bordogna, 2017). It is ongoing and embedded in the sensemaking process, often carried out more evidently during tensions and transitions (Fachin & Davel, 2015; Lucas, 2011) especially those role transitions which are negotiated in situations of conflicting different identities (Ibarra, 1999; Koerner, 2014; Wang et al, 2021).

Identity work underpins individual sensemaking, reconciling multiple identities and their conflicting expectations in ongoing processes to "simplify and order their environment" in the context of work and organisations (Ashforth et al, 2008, 474; Weick et al, 2005). An individual consciously or unconsciously engages in identity work when they "form, repair, maintain, strengthen, or revise their identities". This may include artefacts – "displays of dress, office decor, and personal objects", or cognitive strategies - balancing multiple identities (Kreiner et al., 2006), trying out possible versions of the self (Ghaempanah and Khapova, 2020) and constructing and reconstructing narrative identity (Ibarra and

Barbulescu, 2010, 137). More recently, Brown (2022) commented on the heavy reliance on narrative within identity work research, with narrative used to develop and establish legitimacy and gain acceptance in professional roles (Bloom et al., 2020). If identities are “the various meanings attached to an individual by the self and by others”, then narrative allows the individual to create and share stories to frame appropriate actions and views to support desired meanings in a specific context (Ibarra and Barbulescu 2010, 137).

Methodology

Understanding identity work naturally indicates a qualitative approach, as the individual’s experience of life is constructed as narratives “in which they (re)tell experiences and make sense of them” (Jones et al., 2017, p. 224), interpreting and retelling these via interaction with “colleagues, business contacts, family, institutions, material objects, physical entities and language” over time (Fletcher (2006, p. 422). This necessarily involved the identification of a purposive sample where participants serve as good informants to the phenomena being investigated in relation to their social context (Goulding 2005; Steyaert & Katz, 2004; Watson, 2009).

Given the narrative focus suggested in earlier research (Lebeuvre et al., 2021), a social constructionist approach was adopted to allow exploration of participant experiences and the stories they told about it. Hence, these stories are the narrative we live by (Ghaempanah and Khapova, 2020; Holstein and Gubrium, 2000) are those we tell both to ourselves and to others. As Holstein and Gubrium, (2000, 7) suggest “in endless ways, social actors still refer to, experience, and ‘live by’ the self” where the self is envisaged and understood through the stories we tell, retell and reinvent. These include narratives about the past and possible future as well as the experienced present (Caza et al, 2018). In this way, stories offer a route to understand, explain and reinvent our previous and current identities, providing a way to both interpret and fit our context and to address change (Ashforth et al., 2008). Participants in this study are working as scientific researchers in UK universities, from different overseas locations, and might be expected to construct meaning about their role identity through stories about their experience.

Here stories fulfil a need for meaningfulness by offering a route to construct desired identities, through a reflexive process where individuals attach meaning to themselves in order to answer questions about who they were in the past, who they are now and who they desire to become (Brown, 2015; Weller, 2021). Memories of our experience are shaped into

narratives to provide meaning and to show ‘fit’, to gain acceptance and recognition, to gain legitimacy (Bloom et al, 2021; Brown, 2022). These narratives are both long and short. They include humour and sadness in framing the highs and lows, struggles and setbacks in the past and the present and they are told in ways that fit current meanings, so are adapted and subject to change (Fraher and Gabriel, 2014; Ibarra and Barbulescu, 2010; Weller et al, 2021).

This narrative identity work constructs not only individual but also collective and organisational identities (Weller et al, 2021) to convey organisational past and present, values and practices as well as individual versions of the self and how self and organisation inter-relate (Holstein and Gubrium, 2000). Of interest here will be the context that participants situate themselves in – the collective group they ‘belong’ to and how they see their organisations. Narratives are established in marketing, for instance to establish brand and develop empathy with customers (Dahlén et al, 2009), in stories of place and most importantly for this study, in understanding what entrepreneurship is – what the term means to these individuals and their association with the term (Downing, 2005; Shepherd and Patzelt, 2018). The study will therefore allow participants to consider – and reconsider – their version of self and how both science and entrepreneurship support their stories about who they are.

The gatekeepers to the programme management fully supported the research study, identifying candidates and providing background information as well as contacting candidates to participate. Of the 14 candidates who had competed to take part in this programme, eight participants emerged who were both willing and able to take part in the three-part study. The eight participants who were selected as the purposive sample were all scientific researchers at UK universities, to elicit rich narratives within a specific context through shared sectoral characteristics (Krueger, Reilly, & Carsrud, 2000), they were all designated “entrepreneurial leads” in a competitive process to enter the programme. Thus a ‘thick’ sample was obtained with the likelihood of rich data (Drori, Honig, & Sheaffer, 2009). Such small sample intensive studies have a long track record in identity research (Cohen & Musson, 2000; Heizmann and Liu, 2022; Radu-Lefebvre et al, 2021).

Taking part in an intensive innovative, off-site three-month project allowed individuals to understand how their findings align with market needs and to meet their institutional aims for commercialisation (Sydow et al., 2004). Having been successful in applying to participate in

the programme, these eight participants were keen to be part of the study too, which involved three successive interviews over three months, at the start, after boot camp and after their final activities (options roundabout). Due to Covid-19, one candidate could not complete the study, but their reflections are included to reflect their participation in two of the three interviews. See Table 1 for more details of the sample.

Table 1: Candidate characteristics

Name	Gender	Type of innovation	Sector/industry
Geta	Female	Software	Business sector
Audra	Female	Software	Renewable energy
Adela	Female	New product	Medical sector
John	Male	New testing technology	Medical
Pedro	Male	New scanning technology	Agriculture
Anand	Male	Green house technology	Chemical engineering
Dalmar	Male	Safe eye testing	Scientific engineering
Hao	Male	Technology to absorb heavy metals from the environment	Chemical engineering

A three-stage data collection process using semi-structured interviews was planned to allow participants to explain and re-explain their stories about who they were and are and what they hope to be, as they went through this intensive programme to support commercialisation of research findings. The programme offered pre-course preparation, a one-week boot-camp through which ECRs are engaged in personality analysis, and business canvas development to develop skills and knowledge while building community, followed by 10 weeks of market engagement and a final options roundabout with a panel discussion to bring their ideas into focus. This process is considered highly competitive due to the rigours screening process of the research ideas based on their commercial viability.

As this took place during the Covid-19 pandemic, meetings were all online, both in the programme and in the collection of data. Over a period of three months, 23 semi-structured interviews were conducted overall, held at times and in a manner likely to build rapport and encourage meaningful reflection (Rubel and Okech 2017). It was especially so, given that the interviews were conducted by someone who had already participated in the programme as a scientific researcher and in this sense was identified by participants as an insider given that the interviewer was seen as a member of the same community (Peura et al, 2021). This meant that stories could be narrated, and views offered about their experience assuming shared understanding.

Here discussions of personal meaning and of group and professional role identity included their reflections on their experience of the programme and its impacts on how they saw themselves, their identity narratives. Identity work is performed by an individual to create, support and recreate their view of who they are in changing circumstances, so data was collected in three interviews through stories, both about their past and their perceptions of self as they progressed through the programme (Knights and Clarke, 2014, 337). Questions focused on how they see themselves and how they present themselves to others both in person and online, learning on the programme (and why this was important to them), what entrepreneurship conveyed to them and how they related to the term, with subthemes discussing how the virtual environment impacted upon them and their experience during the pandemic. The exploration of how they felt about entrepreneurship and how they related to it as a concept was important given the complexity of defining entrepreneurship and the importance of understanding personal meaning (Anderson and Starnawska, 2008; Shepherd and Patzelt, 2018).

Data analysis:

The analysis procedure was reflexive (Alvesson 2003) and took the stages suggested by Goulding (2005) with iterative reading and re-reading of scripts by both researchers to allow the text to become familiar and to identify patterns and variances to emerge (Larkin and Thompson 2011). Here the key themes included identity work and how and why it was performed together with their understanding and selfhood in relation to entrepreneurship. Interviews were gathered for each person, so that the story for each emerged through three interviews. In the second stage themes across the group of cases were identified such that similarities and differences emerged between participants experiences. This focused on self-definition stories and the feelings associated with it to understand how participants attributed meaning to programme experiences about who they were.

We also coded to highlight moments where participants defined themselves and how they articulated related goals together with any confusions or tensions. This was then compared with previous research on identity and identity work and what it means to be a scientist and/or an entrepreneur, categorising these as constructs representing understandings and experiences emerging from the transcripts. The process was carefully conducted through joint discussion and alternate interpretations by the two researchers, with interpretations also double checked several times to share and evaluate the themes and categorisations identified

and the meanings attributed to participants responses. Table 2 draws on first stage analysis to explore how participants defined themselves, their introductions about themselves, to researchers and to others.

Findings:

Findings are discussed in two sections. The first considers how participants defined themselves and the identity work they carried out to support this view; the second explores individual constructions of “entrepreneurial lead” and of entrepreneurship and how this applied to them at that point.

Identity work in presenting who I am

As can be seen from Table 2, the discussion of ‘who I am?’ continued for each person throughout the three interviews. At the outset, all participants introduced themselves as an ECR, explaining their qualification history and their research project circumstances. Stories here included how they had begun their careers and had become ECRs. Four, however also discussed being named as entrepreneurial lead within the potential commercialisation project.

Two also emphasised business experience but did so in introducing and explaining their ECR route - as in Pedro’s explanation of leaving a large tech company “you couldn't think too much out of the box. We have to kind of work within the regulation. So, there wasn't too much for you trying to innovate or anything. So that is why I decided to study... I got a scholarship, .. Master by Research. ..doing research with plants and electronics. And then I decided to go further for the PhD, and that is where we are now”.

Table 2 – emerging stories explaining who I am				
	1 st interview		2 nd interview	3rd interview
Audra	ECR	I am Biophysicist by training	Ideally, I would like to have it mixed, not [just] writing papers but improving it to the stage where it will be useful.	, our business education and idea is still far from what we need to run a start-up- but [I am] both researcher and entrepreneur
Adela	ECR	I studied Civil and Energy Engineering - I am just more comfortable with ECR. I use that in all contexts	I enjoy knowledge exchange... engaging with industry, facilitate projects between industry and academia; do my research [maybe] leading the research group	I would say I'm researcher, working on improving knowledge exchange in the offshore wind sector between academia and businesses
Anand	ECR	I am Post-doctoral Research Assistant ..,studied Chemical Engineering	Both entrepreneurial and ECR. - started to do academic things ..10 years ago .. as opposed to business - business experience but I am an ECR 3 years after PhD.	Our work is team-work, very close teamwork. I am a part of that and another one. So, I do not see very much myself, I see the team as an entrepreneur.
Hao	ECR	I am ..an international student, 4th year, Ph.D. university student-chemistry	I want to establish my own company line for this project. It is supported by my supervisor. and my university	very early career researcher or entrepreneurial lead? sometimes I can get the point I think, "Oh, yeah, I am." But .. maybe I am just a researcher
Pedro	Mixture	I am still finishing my PhD. I think a little bit of both entrepreneur and researcher	I am in the middle. I still haven't found that fire in myself to be a true leader, and that is something that I am trying to work on.	Know more .. have better communication skills and understand opportunities...but still in the middle.
Dalmar	Mixture	Really interested in business .. raised my determination to get my degree in Business,[but still came] closer to that engineering scientific side	My most favourite position is Business Development, looking at different strategies to get the company to its target and goals, so if there is an opportunity to .. spin out, I would definitely want it	I would always introduce myself as a university researcher, ... But, I would also introduce saying that my background is business. I would say that I graduated with an International Business degree.
Geta	Mixture	I am a qualified dentist .. but I want to do other things	Entrepreneurship? .. it is .. a journey...there is no one-size-fits-all entrepreneurial plan and you have to try and see what works for you. So in that aspect what I did learn about an entrepreneurial mindset is experiment more. Try, learn more, experiment more,	

		I am going to keep open. I want to be an open-book.	reach out to more people and see what works for you in this <i>No 3rd interview due to Covid-19</i>	
John	ECR	Just submitted PhD; I am ECR	You have to be ready to pivot.. flexibly and being comfortable with that. Resilience ... if something doesn't work, it doesn't matter, pivot, love new stuff, and the work you do.	Entrepreneur or ECR? not mutually exclusive, I am ..Somewhere in-between the two. I [am] ECR .. now developing entrepreneurial skills.

Entrepreneurial lead?

Two explained the transition inevitably accompanying being named as entrepreneurial lead. Adela reflected the change given that a year earlier, she thinks “would see myself still as a junior researcher, more focused, and really thinking in lab frames, just really thinking that experiments are a major part of my project”. Now however, she felt that her “major task is not really making and improving the design of devices but more trying to figure out how they can be useful and how they can be basically sold”. This was an evolving view however, with the researcher identity and entrepreneur identity appearing and disappearing in discussion. Her final view that she might be more entrepreneurial as part of her team in the future, when they all knew more, because they were now “still far from what we need to be” for venture start-up. Similarly, Geta saw herself as a researcher but needing to operate as an entrepreneur, testing the viability of the idea for the market and having to improve her range of knowledge and skills to do so. Three did not discuss their role as being entrepreneurial lead (Audra, Anand and John) while Hao only commented that the bootcamp experience would be “useful for someone like me - ECR or entrepreneurial lead” without commenting further on which he felt most referred to him.

Only one saw himself as “more entrepreneurial lead, more focused on business” than an ECR in these interviews, in his final interview (Dalmar). There were other comments about feeling apprehensive in being seen as leading the commercialisation project. More typical was Pedro’s comment that he had yet to find “that leadership or feel like an entrepreneur “. Four were part of a team which had developed the project, and they stressed entrepreneurship was about the team, not about them and not about individuals, for instance (Audra and Anand). Participants also felt inadequate to the idea of being the lead, as this might require experience, skills and knowledge they did not have, despite what they had learned on the programme - as in Adela’s comment that although feeling “confident about the things I would do...” she still “didn’t don’t know enough”.

Table 3 – entrepreneurship and me

Participant	What it means	How this relates to me
Audra	scientists see entrepreneurship a little bit like money-making. That is not very appealing for scientists for the greater future but there is not really a financial reward ... it is because it is their passion. But I like.. why this organization is working. ... It is actually for people.	I feel confident about what I would have to do if there was a startup ..not.. the financial or business or even IP. I .. know our patent but not..how to make it stronger. So, I feel confident about the things that I would do but I still don't know enough
Adela	..	So I found a different angle to myself. I always imagine myself being a complete introvert.. on the computer, doing research, then I'm speaking with people and .., it's not that bad. It's so scary to speak with people but ..., you can learn so much and why don't you just share the knowledge,
Anand	the entrepreneur is important .. It was not an aim for me to become entrepreneur, to be honest.	Entrepreneur? That is not clear because the nature of our [work]. It is team-work, very close teamwork. I am part of that and another one. So, I do not see very much myself, I see the team as an entrepreneur.
Hao	I think if I want to be an entrepreneur, I have to do something like forcing myself to improve. If I want to succeed, yeah I have to do that. It is not a business or technology. It is also a person, the personality	Entrepreneur or ECR Almost the same place as before but . It is better, it is better
Pedro	maybe you have a brilliant idea, but if it stays in the lab, it is not going to be of any use to anyone outside ..clinic papers. we can actually have more impact outside the industry or just overall in this society.	leadership has to come with how we communicate confidently. I think it is more difficult to feel confident in that situation So yeah, I still haven't found that leadership or feel like an entrepreneur
Dalmar	entrepreneurship mindset .. understanding what other people need then finding how to adapt your research...going out and talking to people, talking investors, venture capitalists, it's not easy, up at crazy hours of the day, stressing yourself not for fainthearted	I see myself as more entrepreneurial lead, more focused on business... how I see the product is more business focused than research focus, maybe ... business development lead, entrepreneurial lead, or it would be a director or a partner or an owner. It's a complex question
Geta	- when you are in entrepreneur- ...you found out that there is a gap if there is one.	I think I am still where I am - coming from a research background, I am very happy to sit behind [a PC] .. no having to talk to [people].

		But I also on entrepreneurial journey, I am grateful and appreciate the opportunity
John	You have these expectations of what Science is and what a scientist is. But.. Science is just the scientific method...theories, testable theories, and then testing. Entrepreneurship is the same with expectations, but what an entrepreneur is, what they look like, but .. entrepreneurship is just the mindset in the same way that the scientific method is. It's just more flexible and based on human interaction rather than physical definitions that exist around us and I think it is incredibly useful.	Entrepreneur or ECR? .. Taking the [programme] lessons then applying them in the same way in a scientific career, imagining how to apply those. I would like to be entrepreneurial in some way. Complementary. Somewhere in-between the two. I see myself as ECR who is now developing entrepreneurial skills. But I am taking them on board rather than just jumping ship for the research and [exploring the] entrepreneur.

Similarly, participants found the idea of entrepreneurship interesting but not necessarily about them. This reflected conflict between professional identities as in comments stressing the importance of entrepreneurship but, as in Anand's case, then explaining that for them "it was not an aim for me to be an entrepreneur". Entrepreneurship also had become "a little bit like money-making" (Audra) so not necessarily relevant to them. More often, participants would respond by focusing on the greater importance of impact or usefulness of the research they were involved in. How this might be achieved, however, was more difficult as knowledge of the possible customers for their product or services were still unknown and their ability to determine this was doubtful (Audra, Adela, Hao, John).

Following initial boot camp, participants gained practical experience of communicating with various audiences, with support from mentors and advisors to counter their uncertainty in interacting with diverse audiences to gain their support (Caza et al., 2018; Drori et al., 2009). In this way, the participants had to step away from accustomed communication levels and practices related to interaction in their ECR role and its discipline, seeking out and encountering audiences with different views of legitimacy based on varied experience and expertise, usefulness, and market relevance (Fisher et al., 2017; Überbacher, 2014). Here participants followed the advice on the programme to construct introductions around who they are as ECRs based in a university, with new research of interest-and tailor their approach in their interactions with contacts (Snihur et al., 2022).

Having practised and gaining support they were then challenged to 'talk to 100 people'. This was an uncomfortable process for participants, who expressed their apprehension in this difficult task through the feeling of "leaving my comfort zone", "very tough" (Dalmar, Hao) and "like being pushed into the deep end of the pool" I had to force myself to have conversations with people" (Geta). Being "super nervous to do the first conversations" was due to never having to do so as a researcher, which might involve "using the computer and doing the coding for myself. I speak with an algorithm, not with people". This meant that deciding "how to ask the right questions? How to fill in the gaps in the conversation was daunting ... a completely new art" (Adela). Their perception of normal working life was that it did not involve "small talk...but to reach a level of rapport" you "have to begin with some level of small talk and emails - something that I've never done" (Geta). This task was "mentally taxing" and required them to "force themselves.. to do this."

This was also an uncertain as well as an unfamiliar process. As John commented, in academia there is “an emphasis on creating solid theories and testing these under careful conditions” but here there was the need to explore customer needs without knowing what the answers might be, especially as they had “no idea what they really wanted...” such that “everyone I talked to ... surprised me in some way”. The range of responses and of the manner of responses was “eye-opening” (Audra) and unpredictable such that if people were “not interested then that there was nothing much they could do about it” (Adela). Individuals carry out identity work so that others see them as an entrepreneur and so that their new product or service is recognised as meeting market need (Navis and Glynn, 2015). Here however only two tried to use identity work to show they were entrepreneurial, and all were focused on their research, their findings, rather than the needs of the market.

Hence, participants explained that they began the process by assuming the meeting would mean that they explained their research and how it worked but the first few interviews soon dispelled that idea. The engagement of their audience was “very hit and miss ... there was no real way of gauging how interested they would be” (John) with “both positive and negative feedback” from respondents (Adela). Two had stressed their business experience and their entrepreneurial identity at the beginning of the programme but they also found the need to reshape their views and explain how they realised the way they had acted and talked did not meet the way they would need to in order to be entrepreneurial. “I had experience approaching people who used to ask about the research before the programme but ... I needed to learn better – how to develop the way I approach people, .. be more direct. “before this “ I didn't know how to approach pricing and to determine how much a solution would need to cost for people to make sense in the market or how much they were willing to pay for it” (Pedro). Here the nascent entrepreneur based their actions both on their own values and beliefs but also on the expectations of the audience (Fauchart and Gruber, 2011; O'Neill et al., 2016; Shepherd, and Patzelt, 2018).

Beliefs about what an entrepreneur is and does, i.e., “money-making” rather than “working for the greater future”, strongly impacted on individual claims to be entrepreneurial, both initially and throughout the programme, although for some this might be “possible in the future” (Adela). This suggests that although these participants formed their self-concept through this formation and reformation of multiple micro identities, continually emerging and re-emerging collectively, a perceived identity conflict still deterred an entrepreneurial identity

even though it was seen as a highly valued possible identity (Raible and Williams-Middleton, 2021). This was seen in the uncertainty expressed about “being an entrepreneur” themselves, even though it was ‘necessary’ or ‘important’. Hence, despite an entrepreneurial identity being perceived as a possible future identity by all participants and the role of entrepreneur being judged to be important, nevertheless identity conflicts led to indecision on some parts and retreat from having an entrepreneurial identity for others (Raible and Williams-Middleton, 2021). By the end of the programme, however, six felt they were in between or both ECRs and entrepreneurs, suggesting that they may be in permanent liminality - occupying either both identities or neither without reaching a new identity (Ybema et al. (2011, 28) while the other two identified themselves as researcher rather than entrepreneur (see Table 4).

Table 4 – mapping the three months via identity work to confirm the identity expressed by participants – entrepreneur or researcher			
	1st interview	2nd interview	3rd interview
Audra	ECR	Both	Both
Adela	ECR	Both	ECR
Anand	ECR	ECR	ECR
Hao	ECR	Both	Both
Pedro	Both / Business	Business	Both
Dalmar	Both	Business	Both/ Business
Geta	Both /ECR	Both /ECR	Covid prevented participation
John	ECR	ECR	Both

Discussion:

The aim of the study was to understand how ECRs make sense of their experience of liminal venturing (Hayter et al, 2017), through their narratives at the three different stages of the commercialisation programme. In this way, their liminal journeys were captured, suggesting new knowledge in the micro-processes of professional role identity work and legitimacy accompanying liminal venturing. Through their narratives, they defined and redefined their identity as the programme progressed, crossing and recrossing what they saw as boundaries between entrepreneur and researcher.

Addressing a gap in current literature related to the variable nature of academic science venturing (Hmieleski and Powell 2018), it did so by taking a micro level approach in

mapping individual interests and reasons underlying science academic entrepreneurship (Hayter et al. 2021,14). We introduce the framework of identities interactions among ECR (Figure 1), which maps the responses, showing firstly the identity work used to support their view of who they were, through which the participants expressed the process of sense making between their self-identity and social identity. It is a linear model which does not reflect the process of ‘one step forwards and one back’ commented on by participants but is intended to reflect the processes at work. Although defining their experience as a journey, most participants were still ‘in transit’ by the end of the study, recognising this in what they still needed to learn or to do.

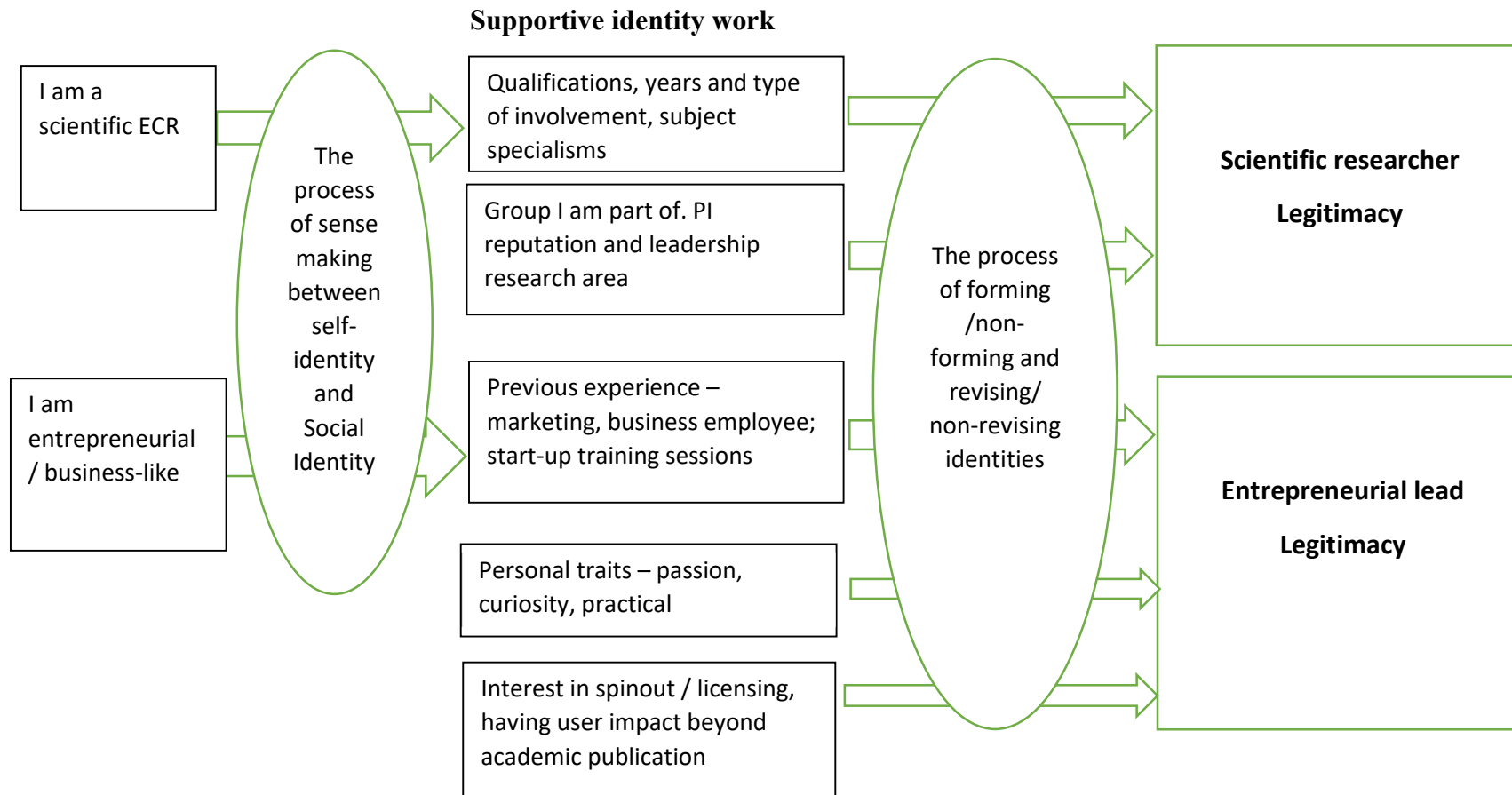
The second contribution arises from understanding the “others” shaping their identity and the impact of this on how they approach commercialisation. The participants discussed their view of who they were as part of their creation and maintenance of meaning through interaction with colleagues and reflection on their experience (Berger & Luckman, 1967; Suddaby et al, 2017, 576). In the context of this programme, participants had formed, discarded, revised and maintained their professional role identity through interactions with their external environment, which required new skills and contact with diverse audiences. Reality was constructed through interactions with the context of the programme, fellow trainees, entrepreneurs, advisors and tutors, other members of that context (Caza et al, 2016; Sandberg and Tsoukas, 2015), through who they were – and who they were not (Skovgaard-Smith et al., 2020). Reconsidering beliefs about who they were, required identity work to reinstate an identity or to tentatively create a new identity, both consciously and unconsciously as an iterative liminal process through the programme (Beech 2011; Ladgeet al. 2012; Sandberg and Tsoukas, 2015).

Their professional role identity as an ECR as discussed in their first interviews was formed by combining meanings they associated with their role and by their understanding of others’ views of what a researcher is or should be, suggesting liminality in the creation and recreation of identities to be seen as a researcher (Bloom et al, 2021). Identity work included discussion of themselves as ECRs, as belonging to a team and institution with status and reputation, as qualified and experienced. Despite this, they then diminished their roles, emphasising that they were just part of the team. The participants saw senior researchers (Principal Investigators (PIs) and professors) as possessing academic legitimacy and their friendship and relationships with them were part of the ongoing process of establishing ECR legitimacy.

Hence senior researchers possessed legitimacy through their reputation and status whereas participants were still in the process of establishing the same legitimacy, whatever their stage, supporting the view that becoming an 'academic' may be a precarious, contingent process where legitimacy is always provisional and reliant on conferral from those who are powerfully positioned both within and beyond the institution of the academy (Gabon et al, 2018, 261).

Thirdly, in terms of developing an entrepreneurial identity, the participants demonstrated the ongoing liminality involved in the interplay between self-identity and social identity, being recognised as such by participants who saw it as an ongoing process (4 participants) a route (2 participants) and a journey (2 participants). By the end of the programme six felt comfortable to suggest they were "somewhere between" an ECR and an entrepreneur – having features of both perceived identities in defining who they were (Ibarra, and Barbulescu, 2010; Shepherd and Patzelt, 2018). Here the underlying reasons for them to be on the programme – external requirements (the need to gain research funding or other income streams in their institution) or internal factors - intrinsic interest – also came into play in defining and refining their view of self, with elements of both researcher and entrepreneur recognised as part of their current self by the end of the programme.

Figure 1 –Framework of identities interactions among ECR



Limitations and opportunities for future research:

This is a qualitative study, carried out over a period of time. A large-scale quantitative study might test some of the ideas raised here, as might a longer qualitative study with a different purposive sample (at future research might include investigations of how legitimacy impacts on identity formation and individual perceptions of what constitutes ‘personal legitimacy’ in an ECR, an entrepreneur – or both simultaneously. Similarly, further research might tease out the role of both external needs and internal factors in driving the individual to claim an entrepreneurial identity.

Conclusion:

This study aimed to explore the liminal nature of entrepreneurial identity formation among a group of scientific early career researchers (ECRs) participating in a programme to support the commercialisation of their research. Through narrative identity work, they illustrated the liminal nature of their journey, transitioning and re-transitioning between ECR and entrepreneur. In doing so, the paper contributes to understanding of the academic science entrepreneur and to the nature and role of others in defining not only ‘Who I am’ but ‘who I am not’ by considering the role of perceived personal legitimacy throughout identity construction, whether as an ECR or as an entrepreneur.

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